

What is claimed is:

1. A method of handling a transition in a group of services in a distributed computing application comprising the steps of:

determining the need for the transition;

determining a correct group proxy shell and service proxies for the transitioned group; and

updating a group proxy, said group proxy being associated with a client that calls the group, so that the group proxy contains the correct group proxy shell and service proxies.

2. The method of claim 1 wherein the transition is a fail-over from one service to another service within the group, the addition of a new service to the group, the removal of a service from the group, or a change in group mode.

3. The method of claim 1 wherein there are a plurality of clients that call the group, each client having its own instance of the group proxy associated with it, and the updating step of claim 1 is performed for the group proxy of each client that calls the transitioning group.

4. The method of claim 1 wherein the step of updating the group proxy is further comprised of adding at least one service proxy, deleting at least one service proxy, swapping a group proxy shell, or reconfiguring the group proxy shell for a new group mode.

5. The method of claim 1 wherein the group is a peer group or a coordinator cohort group.

6. The method of claim 1 further comprising the steps of:

deregistering the group from a lookup service; and

after the transition is complete, registering the group, along with the updated group proxy, with the lookup service.

7. A computer readable medium containing instructions for controlling a computer system to perform a method of handling a transition in a group of services in a distributed computing application comprising the steps of:

determining the need for the transition;

determining a correct group proxy shell and service proxies for the transitioned group; and

updating a group proxy, said group proxy being associated with a client that calls the group, so that the group proxy contains the correct group proxy shell and service proxies.

8. The computer readable medium of claim 7 wherein the transition is a fail-over from one service to another service within the group, the addition of a new service to the group, the removal of a service from the group, or a change in group mode.

9. The computer readable medium of claim 7 wherein there are a plurality of clients that call the group, each client having its own instance of the group proxy associated with it, and the updating step of claim 7 is performed for the group proxy of each client that calls the transitioning group.
- 5 10. The computer readable medium of claim 7 wherein the step of updating the group proxy is further comprised of adding at least one service proxy, deleting at least one service proxy, swapping a group proxy shell, or reconfiguring the group proxy shell for a new group mode.
11. The computer readable medium of claim 7 wherein the group is a peer group or a coordinator cohort group.
- 10 12. The computer readable medium of claim 7 wherein the method is further comprised of the steps of:
- deregistering the group from a lookup service; and
- after the transition is complete, registering the group, along with the updated group proxy, with the lookup service.
- 15 13. A method of handling a transition in a group of services in a distributed computing application comprising the steps of:
- instructing a group proxy, said group proxy being associated with a client that calls the group, to begin buffering commands from the client to the group;
- the group proxy intercepting and storing commands from the client to the group until the transition is complete; and
- 20 20 after the transition is complete, the group proxy sending the stored commands from the client to the group.
14. The method of claim 13 wherein the transition is a fail-over from one service to another service within the group, the addition of a new service to the group, the removal of a service from the group, or a change in group mode.
- 25 15. The method of claim 13 wherein there are a plurality of clients that call the group, each client having its own instance of the group proxy associated with it, and the steps of claim 13 are performed for the group proxy of each client that calls the group.
16. The method of claim 13 further comprising the step of updating the group proxy prior to the group proxy sending the stored commands.
- 30 17. The method of claim 16 wherein the step of updating the group proxy is further comprised of adding a service proxy, deleting a service proxy, swapping a group proxy shell, or reconfiguring the group proxy shell for a new group mode.
18. The method of claim 13 wherein the group is a peer group or a coordinator cohort group.

19. The method of claim 13 further comprising the steps of:
- deregistering the group from a lookup service; and
 - after the transition is complete, registering the group, along with an updated group proxy, with the lookup service.
- 5 20. A computer readable medium containing instructions for controlling a computer system to perform a method of handling a transition in a group of services in a distributed computing application comprising the steps of:
- instructing a group proxy, said group proxy being associated with a client that calls the group, to begin buffering commands from the client to the group;
 - 10 the group proxy intercepting and storing commands from the client to the group until the transition is complete; and
 - after the transition is complete, the group proxy sending the stored commands from the client to the group.
- 15 21. The computer readable medium of claim 20 wherein the transition is a fail-over from one service to another service within the group, the addition of a new service to the group, the removal of a service from the group, or a change in group mode.
- 20 22. The computer readable medium of claim 20 wherein there are a plurality of clients that call the group, each client having its own instance of the group proxy associated with it, and the steps of claim 20 are performed for the group proxy of each client that calls the group.
- 25 23. The computer readable medium of claim 20 wherein the method is further comprised of the step of updating the group proxy prior to the group proxy sending the stored commands.
24. The computer readable medium of claim 23 wherein the step of updating the group proxy is further comprised of adding a service proxy, deleting a service proxy, swapping a group proxy shell, or reconfiguring the group proxy shell for a new group mode.
- 25 25. The computer readable medium of claim 20 wherein the group is a peer group or a coordinator cohort group.
26. The computer readable medium of claim 20 wherein the method is further comprised of the steps of:
- deregistering the group from a lookup service; and
 - 30 after the transition is complete, registering the group, along with an updated group proxy, with the lookup service.
27. A method of internally switching the group mode of a group of services in order to perform a task comprising the steps of:

a grouping agent for one of the services in the group instructing the grouping agents for the other services in the group to switch to a new group mode;

all of the grouping agents in the group switching to the new group mode;

performing the task;

5 a grouping agent for one of the services in the group instructing the grouping agents for the other services in the group to return to the original group mode; and

all of the grouping agents in the group returning to the original group mode.

28. The method of claim 27 wherein the group modes are peer or coordinator cohort.

10 29. The method of claim 27 wherein the group does not appear to change group modes to its client.

30. The method of claim 27 wherein commands from a client of the group are buffered until the group returns to its original mode.

31. The method of claim 30 wherein the commands are buffered by at least one of the grouping agents.

15 32. A computer readable medium containing instructions for controlling a computer system to perform a method of internally switching the group mode of a group of services in order to perform a task comprising the steps of:

a grouping agent for one of the services in the group instructing the grouping agents for the other services in the group to switch to a new group mode;

20 all of the grouping agents in the group switching to the new group mode;

performing the task;

a grouping agent for one of the services in the group instructing the grouping agents for the other services in the group to return to the original group mode; and

all of the grouping agents in the group returning to the original group mode.

25 33. The computer readable medium of claim 32 wherein the group modes are peer or coordinator cohort.

34. The computer readable medium of claim 32 wherein the group does not appear to change group modes to its client.

30 35. The computer readable medium of claim 32 wherein commands from a client of the group are buffered until the group returns to its original mode.

36. The computer readable medium of claim 35 wherein the commands are buffered by at least one of the grouping agents.

37. A method of sending a command from a peer group of services to a service outside the group comprising the steps of:

5 changing the group to a coordinator cohort group with one of the services in the group acting as coordinator;

the coordinator service sending a command to the outside service;

the coordinator service receiving the command response from the outside service;

10 the coordinator service sharing the command response with all the other services in the group; and

returning the group to a peer group.

38. The method of claim 37 wherein the group does not appear to change group modes to its client.

39. The method of claim 37 wherein communication between the services in the group is handled by a grouping agent for each service in the group.

40. The method described in claim 37 wherein commands from a client of the group are buffered while the group is a coordinator cohort group.

41. A computer readable medium containing instructions for controlling a computer system to perform a method of sending a command from a peer group of services to a service outside the group comprising the steps of:

changing the group to a coordinator cohort group with one of the services in the group acting as coordinator;

the coordinator service sending a command to the outside service;

the coordinator service receiving the command response from the outside service;

25 the coordinator service sharing the command response with all the other services in the group; and

returning the group to a peer group.

42. The computer readable medium of claim 41 wherein the group does not appear to change group modes to its client.

30 43. The computer readable medium of claim 41 wherein communication between the services in the group is handled by a grouping agent for each service in the group.

44. The computer readable medium of claim 41 wherein commands from a client of the group are buffered while the group is a coordinator cohort group.

45. A method of testing a new service in parallel with an old service in a distributed computing application comprising the steps of:

- 5 initiating the new service in the distributed application;
- forming a group containing at least the old service;
- providing a client of the group with a group proxy for the group;
- the group proxy copying any commands sent from the client to the group to the new service; and
- 10 evaluating the performance of the new service.

46. The method of claim 45 wherein there are a plurality of clients, each with a replica of the group proxy, and each replica copying any commands sent from its client to the new service.

47. The method of claim 45 wherein the group is comprised of a single service, said single service being the old service.

15 48. The method of claim 45 wherein the new service is part of the group.

49. The method of claim 45 wherein the group is a peer group or a coordinator cohort group.

50. A computer readable medium containing instructions for controlling a computer system to perform a method of testing a new service in parallel with an old service in a distributed computing application comprising the steps of:

- 20 initiating the new service in the distributed application;
- forming a group containing at least the old service;
- providing a client of the group with a group proxy for the group;
- the group proxy copying any commands sent from the client to the group to the new service; and
- 25 evaluating the performance of the new service.

51. The computer readable medium of claim 50 wherein there are a plurality of clients, each with a replica of the group proxy, and each replica copying any commands sent from its client to the new service.

30 52. The computer readable medium of claim 50 wherein the group is comprised of a single service, said single service being the old service.

53. The computer readable medium of claim 50 wherein the new service is part of the group.

54. The computer readable medium of claim 50 wherein the group is a peer group or a coordinator cohort group.

55. A method of grouping services in a distributed computing application comprising the steps of:

initiating a plurality of services arranged into a group, with each service having its own service proxy and grouping agent;

each grouping agent registering its associated service with a group service including providing the group service with the service proxy of the service it is registering;

the group service bundling a first group logic shell for a first group mode with at least one of the service proxies to form a first group proxy for the group;

the group service bundling a second group logic shell for a second group mode with at least one of the service proxies to form a second group proxy for the group;

the group service providing the first group proxy to a first client and the second group proxy to a second client;

the first client using the first group proxy to call the group in the first group mode; and

the second client using the second group proxy to call the group in the second group mode.

56. The method of claim 55 wherein the first group mode and second group mode are selected from the set comprising peer and coordinator cohort.

57. The method of claim 55 wherein the first client and the second client are the same client.

58. The method of claim 55 wherein the group acts simultaneously in the first group mode and second group mode.

59. A computer readable medium containing instructions for controlling a computer system to perform a method of grouping services in a distributed computing application comprising the steps of:

initiating a plurality of services arranged into a group, with each service having its own service proxy and grouping agent;

each grouping agent registering its associated service with a group service including providing the group service with the service proxy of the service it is registering;

the group service bundling a first group logic shell for a first group mode with at least one of the service proxies to form a first group proxy for the group;

the group service bundling a second group logic shell for a second group mode with at least one of the service proxies to form a second group proxy for the group;

the group service providing the first group proxy to a first client and the second group proxy to a second client;

5 the first client using the first group proxy to call the group in the first group mode; and

the second client using the second group proxy to call the group in the second group mode.

60. The computer readable medium of claim 59 wherein the first group mode and second group mode are selected from the set comprising peer and coordinator cohort.

10 61. The computer readable medium of claim 59 wherein the first client and the second client are the same client.

62. The computer readable medium of claim 59 wherein the group acts simultaneously in the first group mode and second group mode.